

# WO9320977

Publication Title:

## CASSETTE FOR USE IN A STAPLER

Abstract:

Abstract of WO9320977

A cassette (10a, 10b, 11), which contains juxtaposed wire staple blanks releasably interconnected to form at least one strip (8) of staple blanks, is adapted to be used in a stapler for driving staples into an object, such as a sheaf of papers. The staple 11b5 r comprises a base and a stapler head movable in relation to the base. The cassette accommodates a reciprocating staple shaper (20), adapted to successively shape the staple blanks of the strip (8) into U-shaped staples, and a reciprocating staple driver (19), adapted to successively release the thus-formed staples from the strip (8) and drive them into an object. The cassette has a front wall (11) in which the staple shaper (20) and the staple driver (19) are displaceably guided, as well as recesses through which projections on the staple shaper and the staple driver project, so as to engage, when the cassette is mounted in the stapler head, a drive mechanism (4) arranged in the stapler head to reciprocate the staple shaper and the staple driver.

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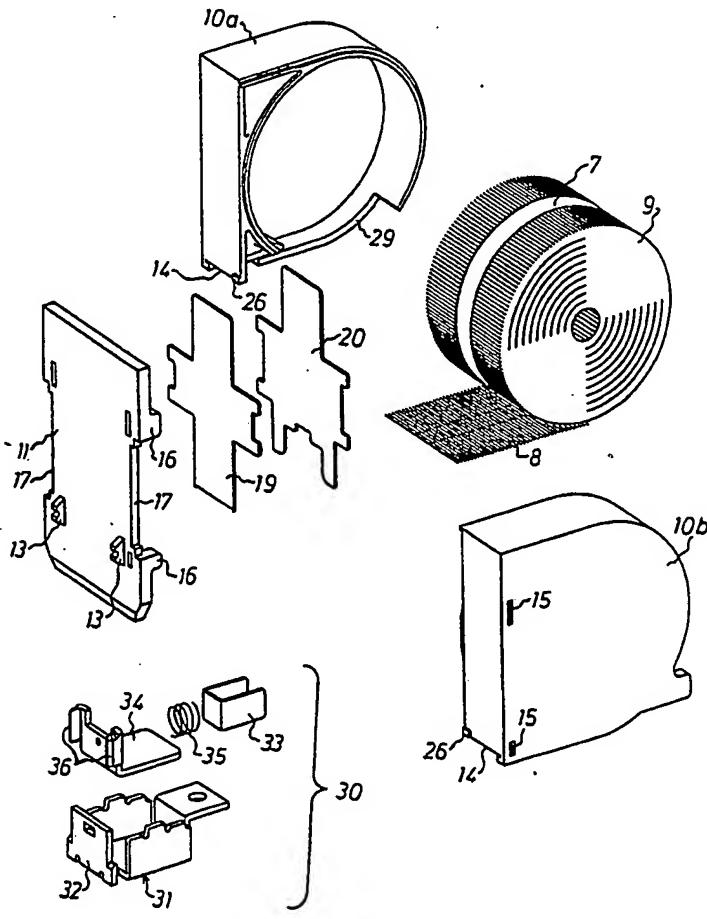
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## (54) Title: CASSETTE FOR USE IN A STAPLER

## (57) Abstract

A cassette (10a, 10b, 11), which contains juxtaposed wire staple blanks releasably interconnected to form at least one strip (8) of staple blanks, is adapted to be used in a stapler for driving staples into an object, such as a sheaf of papers. The stapler comprises a base and a stapler head movable in relation to the base. The cassette accommodates a reciprocating staple shaper (20), adapted to successively shape the staple blanks of the strip (8) into U-shaped staples, and a reciprocating staple driver (19), adapted to successively release the thus-formed staples from the strip (8) and drive them into an object. The cassette has a front wall (11) in which the staple shaper (20) and the staple driver (19) are displaceably guided, as well as recesses through which projections on the staple shaper and the staple driver project, so as to engage, when the cassette is mounted in the stapler head, a drive mechanism (4) arranged in the stapler head to reciprocate the staple shaper and the staple driver.



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CASSETTE FOR USE IN A STAPLER

The present invention relates to a cassette which contains juxtaposed wire staple blanks releasably interconnected to form at least one strip of staple blanks and which is adapted to be used in a stapler for driving staples into an object, such as a sheaf of papers, said stapler comprising a base, a stapler head movable in relation to the base, and a drive mechanism for reciprocating both a reciprocating staple shaper arranged to successively shape the staple blanks of the strip into substantially U-shaped staples, and a reciprocating staple driver arranged to successively release the thus-formed staples from the strip and drive them into an object.

Usually, conventional staplers have a base, a stapler head pivotably connected to the base, and a magazine arranged in the stapler head and containing U-shaped staples disposed close to one another in a long row. Naturally, the largest number of staples in the magazine may vary from one stapler to another, but generally is in the order of a few hundreds.

To increase the largest number of staples with which to charge the stapler, the magazine in electrically driven staplers, which are very common, has been replaced with a cassette containing juxtaposed wire staple blanks releasably interconnected to form at least one strip of staple blanks. When the staple blanks form several strips, these are comparatively short and in the form of plates stacked in the cassette. Also, the staple blanks may form a single long strip rolled up into a roll. Prior-art cassettes containing plates of staple blanks are disclosed in EP-A1-0 366 094 and US-4,623,082, and prior-art cassettes containing a rolled-up strip of staple blanks are disclosed in US-4,570,841, US-4,573,625, US-4,588,121, US-4,720,033 and US-4,770,334. Such a cassette may contain several thousands of staple blanks.

In much-used cassette-equipped staplers, the staple shaper, serving to shape the staple blanks into U-shaped staples, and the staple driver, serving to expel the U-shaped staples, are worn and have to be replaced after some time. To replace these components in the prior-art staplers is a very complicated operation and has to be performed by specially trained personnel. Another disadvantage of the known staplers is that trained personnel sometimes has to be sent for also when a staple has got stuck in the stapler. This is so because it is difficult to get at the stuck staple, which sometimes may only be removed after the dismounting of certain stapler components, such as the staple shaper and the staple driver.

Generally, the object of the present invention is to provide a cassette-equipped stapler obviating the drawbacks mentioned above. More specifically, the object of the invention is to provide a cassette making it possible to readily replace the staple shaper and the staple driver as well as take care of stoppages caused by a staple stuck in the stapler.

According to the invention, this object is achieved by a cassette which is of the type mentioned by way of introduction and which is characterised in that it accommodates the staple shaper and the staple driver, that it has a front wall in which the staple shaper and the staple driver are displaceably guided, as well as recesses through which projections on the staple shaper and the staple driver project, and that it is designed to be so mounted in the stapler head that the staple shaper and the staple driver with their projections engage the drive mechanism to be reciprocated thereby.

Being provided in the cassette, the staple shaper and the staple driver are readily replaced every time a new cassette is inserted in the stapler. A stoppage caused by a stuck staple is easily taken care of by exposing the location of the stuck staple by removing the cassette from the stapler.

In a preferred embodiment, the cassette is composed of a casing in which the strip is provided and which has a front opening for discharging the strip, and a front plate which forms the front wall and is releasably attached to the casing over the discharge opening and which has, in the side facing the casing, means for guiding the staple shaper and the staple driver.

The invention will be described in more detail below with reference to the accompanying drawings, in which  
10 Fig. 1 is a perspective view of an electric stapler and an inventive cassette shown separately;

Fig. 2 is a perspective view of the stapler with the cassette inserted therein;

15 Fig. 3 is an exploded perspective view of the cassette and a mechanism cooperating therewith;

Fig. 4 is an exploded perspective view of the front plate of the cassette, a staple driver and a staple shaper;

20 Fig. 5 is a perspective view of the front plate with the staple driver provided therein;

Fig. 6 is a perspective view of the front plate with the staple driver and the staple shaper provided therein; and

25 Figs 7-10 are schematic perspective views illustrating the function of the stapler equipped with the inventive cassette.

The stapler illustrated in Figs 1 and 2 is electrically operated and has a stationary base 1 and a stapler head 2 pivotably connected to the base 1. The stapler head 30 2 is pivotable about a transverse pin 3 and is shown, in Figs 1 and 2, in an upper starting position.

35 The stapler head 2 is a U-shaped channel in which is provided a drive mechanism in the form of two arms 4. At the rear end, the arms 4 are each pivotably connected to a side wall of the U-shaped channel. The arms 4 extend forwards in parallel with the side walls and project, at the front end, a distance beyond the stapler head 2. The

arms 4 are each pivotable about a transverse pivot pin 5. The pivot pins 5 are situated opposite to one another and in parallel with the pin 3. In Figs 1 and 2, the arms 4 are shown in an upper position.

5 With the stapler goes a cassette 6 containing straight wire staple blanks which are juxtaposed and releasably interconnected by a tape 7 so as to form a strip 8 of staple blanks, which is rolled up into a roll 9 (Fig. 3).

10 The cassette 6, which is made of plastics material, is composed of a casing 10 consisting of two essentially mirror-inverted halves 10a and 10b and a front plate 11 connected to the casing 10. The cassette 6 can be inserted in the stapler head 2, as illustrated in Fig. 2. When 15 inserted, the cassette 6 is kept in place by a pivotable spring clip 12 pivotably attached to the stapler head 2 and engaging grooves provided in two lugs 13 on the outside of the front plate 11.

When assembled, the two halves 10a and 10b form a 20 casing 10 having a cylindrical inner chamber for the strip roll 9. In its lower portion, the casing 10 has a front opening 14 for discharging the strip 8. Both halves 10a and 10b have two external lateral recesses 15 in the front portion. The front plate 11, which is of essentially rectangular shape, has, at each of its two vertical long-side edges, two lugs 16 with inwardly-directed projecting portions engaging the lateral recesses 15 of the halves 10a and 10b when the cassette 16 is completely assembled, as 25 illustrated in Fig. 1. Then, the front plate 11 holds the two halves 10a and 10b together. To this end, use is conveniently also made of a tape (not shown), which is applied at least along a certain distance of the joint 30 between the two halves.

In each of the vertical long-side edges, the front 35 plate 11 has a recess 17 extending between the two lugs 16 to permit the projecting portion of the arm 4 to pass.

The recesses 17 have such a vertical extent as to permit the arms 4 to pivot (see Fig. 2).

In the inner side, i.e. the side facing the casing 10, the front plate 11 has a cruciform recess 18. The two 5 horizontal portions and the lower vertical portion of the cruciform recess 18 extend up to the edges of the front plate 11, while the upper vertical portion ends at a distance inwardly of the upper horizontal edge of the front plate 11. The cruciform recess 18 serves to receive and 10 guide a staple driver 19 and a staple shaper 20, which consist of substantially cruciform thin metal sheets. The portion 21 of the front plate 11 that defines the cruciform recess 18 upwardly is thicker than the plate portion 22 that defines the lower part of the recess. The 15 thinner portion 22 has such a thickness as to be located on the same level as the staple driver 19 when this is inserted in the recess 18 (Fig. 5). The thicker portion 21 is located on the same level as the staple shaper 20 when this is inserted in the recess 18 on top of the staple 20 driver 19 (Fig. 6). The thinner portion 22 has two lugs 23 located one on each side of the lower vertical portion of the recess 18 and projecting to the same level as the thicker portion 21. The difference in level between the bottom of the recess 18 and the thinner portion 22 equals 25 the thickness of the wire staple blank.

The upper vertical arms of the substantially cruciform metal sheets 19 and 20 have the same width as the upper vertical portion of the cruciform recess 18 (see Figs 5 and 6), and the lower vertical arm of the metal 30 sheet 19 has the same width as the lower vertical portion of the recess 18 (see Fig. 5). The lower vertical arm of the metal sheet 20, however, is much broader than the lower vertical portion of the recess 18 (see Fig 6). The lower vertical arm of the metal sheet 20, whose width 35 equals the distance between the two lugs 23, has, at its lower edge, a rectangular recess 24 of the same width as the lower vertical portion of the cruciform recess 18 (see

Fig. 6). At the bottom, the rectangular recess 24 has a smaller rectangular recess 25 adapted to receive, when the metal sheet 20 is displaced downwardly, a stop lug 26 which is provided just above the front opening 14 of the 5 casing 10 and whose function will be described in more detail below. At the outer end, the two horizontal arms of the metal sheet 19 have a rectangular recess 27 whose width, i.e. vertical extent, equals the vertical extent of the respective arms 4 in the projecting portion received in the recess 27 when the cassette 6 is inserted in the 10 stapler head 2 (Fig. 2). At the outer end, the two horizontal arms of the metal sheet 20 have a rectangular recess 28 of much larger width, i.e. vertical extent, than the corresponding recess 27 in the metal sheet 19. The 15 projecting portions of the arms 4 are received in the recesses 28 of the metal sheet 20 when the cassette 6 is inserted in the stapler head 2 (Fig. 2).

In Fig. 6, the staple driver 19 and the staple shaper 20 are shown in the starting position, in which they are 20 held by the arms 4 in the manner shown in Fig. 7 and in which the horizontal arms of the staple driver 19 and the staple shaper 20 are applied against the portion 21.

As appears from the foregoing, the cassette 6 contains the staple driver 19 as well as the staple shaper 25 20, which both constitute wearing components in a heavily-used stapler. Thus, the components 19 and 20 are replaced in a particularly simple way each time the cassette is replaced.

Naturally, the cassette is replaced when the strip 8 30 of staple blanks has been used up. Each half 10a and 10b of the casing has a recess 29. When the halves 10a and 10b are joined together, the recesses 29 form an opening through which it is possible to sense, with the aid of a suitable means (not shown), when the tail end of the strip 35 8 passes the opening and the cassette 6 thus should be replaced.

A mechanism 30 for cooperating with the staple driver 19 and the staple shaper 20 is fixed to the stapler head 2 in the front portion, as appears most clearly from Fig. 1. The mechanism 30 consists of a box-like element 31, whose 5 front wall 32 forms a die on which the staple blanks are formed into U-shaped staples, a spring seat 33, a feeding element 34 and a spring 35. The spring seat 33 is provided in the rear portion of the box-like element 31, while the feeding element 34 is provided in the front portion. The 10 spring 35 is arranged between the spring seat 33 and the feeding element 34 so as to push the latter forwards. The feeding element 34 is substantially L-shaped and has a front leg which is directed vertically upwards and which has two feeders 36 projecting forwards in the form of vertical ribs extending up to the front surface of the front wall 32. Each rib 36 has an upper bevelled surface, located on a level with the flat horizontal upper surface of the front wall 32, as well as a front bevelled surface. 15

The function of the stapler will now be described in 20 more detail with reference to Figs 7-10.

As mentioned before, the illustrated stapler is electrically operated, and is driven by an electric motor (not shown) which, via a transmission mechanism (not shown), pivots the arms 4 between an upper starting position 25 (shown in Figs 1, 2 and 7) and a lower turning position (shown in Fig. 10).

When the stapler head 2 is in the upper starting position (Figs 1 and 2), a sheaf of papers 37 is placed in the stapler between the base 1 and the stapler head 2. 30 A microswitch 38 is then actuated and starts the motor. Then, the motor first pivots the stapler head 2 down to a position in which the mechanism 30 is applied against the sheaf of papers 37 (see Figs 7-10).

Thereafter, the motor pivots the arms 4 downwards 35 from the starting position, in which they hold the staple driver 19 and the staple shaper 20 in the starting position (Fig. 6), as mentioned before. In the position shown

in Fig. 7, the feeding element 34 pushes the first staple blank 39, which has already been bent into a U-shaped staple, so that it is applied against the bottom of the lower vertical portion of the cruciform recess 18. Then,

5 the two feeders 36 of the feeding element 34 are each pressed against a leg of the staple 39. In the position shown in Fig. 7, the second staple blank 40 is located straight above the front wall or die 32. The staple driver 19 and the staple shaper 20 are situated straight above,

10 respectively, the first staple blank or staple 39 and the second staple blank 40. When pivoted downwards from the starting position, the arms 4 entrain the staple driver 19, which thus releases from the strip 8 the blank 39 formed into a U-shaped staple, and drives it downwards.

15 When the free leg ends of the staple 39 reach the sheaf of papers 37 (Fig. 8), the arms 4 are applied against the lower defining edge of the respective recesses 28 in the staple shaper 20, which thus is entrained when the arms 4 are further pivoted downwards.

20 When the arms 4 are pivoted further downwards from the position shown in Fig. 8, the staple driver 19 drives the legs of the staple 39 through the sheaf of papers 37, at the same time as the staple shaper 20 bends the second staple blank 40 on the front wall or die 32 (see Fig. 9).

25 While the blank 40 is thus bent, the feeding element 34 is pushed rearwards owing to the fact that those parts of the blank 40 that are being bent to form the legs of the finished U-shaped staple are pressed against the bevelled surfaces of the respective feeders 36.

30 When the arms 4 have reached the lower position (Fig. 10), the staple driver 19 has driven the staple 39 into the sheets of paper and the staple shaper 20 has bent the staple blank 40 into a finished U-shaped staple.

At the same time as the staple 39 is driven into the

35 sheaf of papers 37, its legs are bent towards one another with the aid of a clinching mechanism (not described in detail here or shown) which completes the bending of the

legs which thus are applied against the underside of the sheaf of papers 37 after the position shown in Fig. 10 has been reached. Then, the arms 4 are swung back to the starting position.

5 When swung back to the upper position, the arms 4 entrain the staple driver 19 and the staple shaper 20 to the starting position. The stop lug 26 provided on the casing 10 prevents the newly-shaped staple 40 from accompanying the staple shaper 20 when moved upwards. When the 10 staple driver 19 and the staple shaper 20 have reached the starting position, the strip 8 is advanced one step by the feeding element 34 pushing the staple 40 into engagement against the bottom of the lower vertical portion of the cruciform recess 18. The stapling cycle is thus completed.

15 As is evident, the area where staples may get stuck in the stapler is exposed when the cassette 6 is removed, so that a stoppage caused by a stuck staple is easily taken care of.

It goes without saying that the cassette may be modified in various ways within the scope of the invention as defined in the appended claims. For instance, the cassette may thus contain, instead of a staple strip rolled up into a roll, a plurality of short strips stacked in the form of plates.

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## CLAIMS

1. A cassette which contains juxtaposed wire staple blanks releasably interconnected to form at least one strip (8) of staple blanks and which is adapted to be used in a stapler for driving staples into an object (37), such as a sheaf of papers, said stapler comprising a base (1), a stapler head (2) movable in relation to the base, and a drive mechanism (4) for reciprocating both a reciprocating staple shaper (20) arranged to successively shape the staple blanks of the strip (8) into substantially U-shaped staples, and a reciprocating staple driver (19) arranged to successively release the thus-formed staples from the strip and drive them into an object (37), characterised in that it accommodates the staple shaper (20) and the staple driver (19), that it has a front wall (11) in which the staple shaper (20) and the staple driver (19) are displaceably guided, as well as recesses through which projections on the staple shaper (20) and the staple driver (19) project, and that it is designed to be so mounted in the stapler head (2) that the staple shaper (20) and the staple driver (19) with their projections engage the drive mechanism (4) to be reciprocated thereby.
2. A cassette as set forth in claim 1, characterised in that it is composed of a casing (10) in which the strip (8) is provided and which has a front opening (14) for discharging the strip (8), and a front plate (11) which forms the front wall and is releasably attached to the casing (10) over the discharge opening (14) and which has, in the side facing the casing, means (18, 21, 22, 23) for guiding the staple shaper (20) and the staple driver (19).

FIG.1

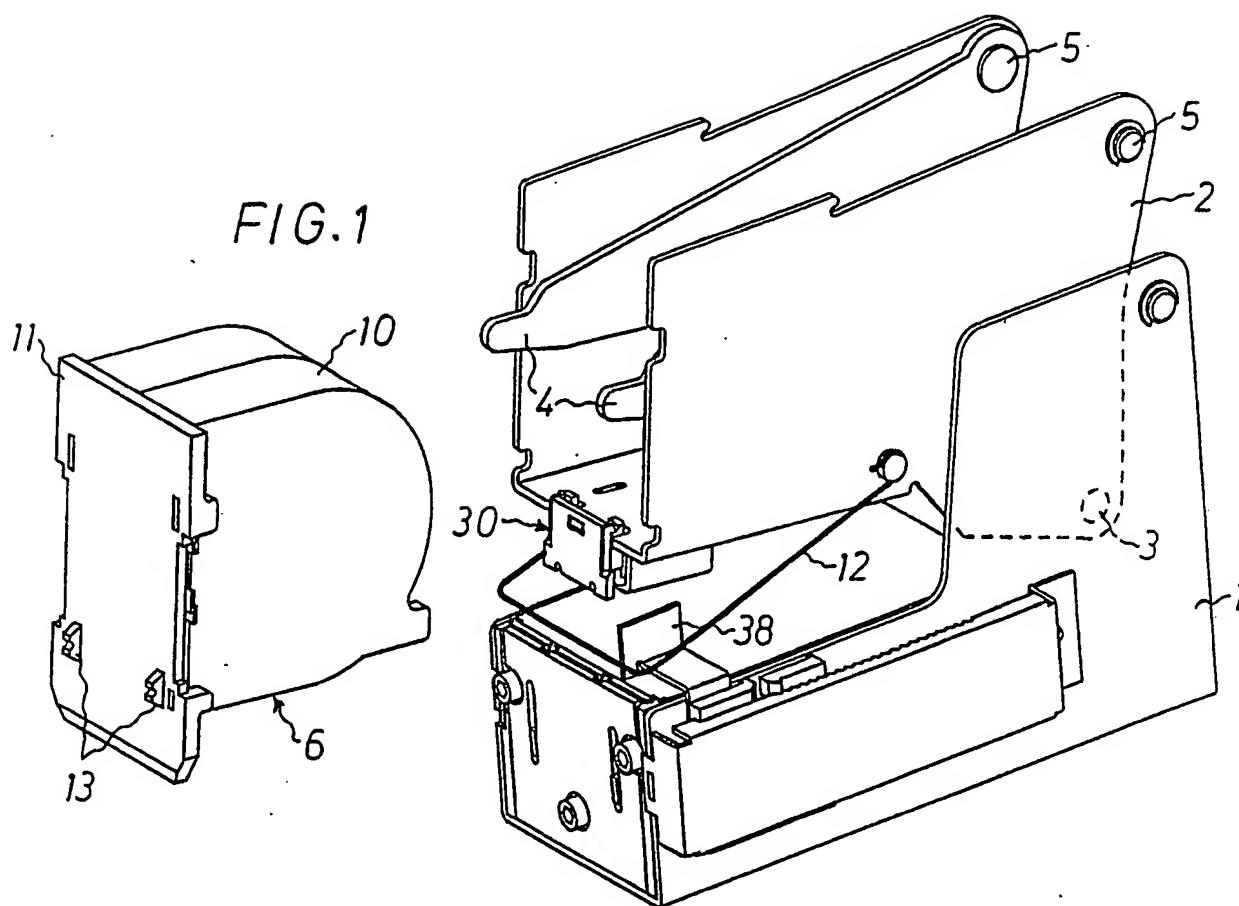
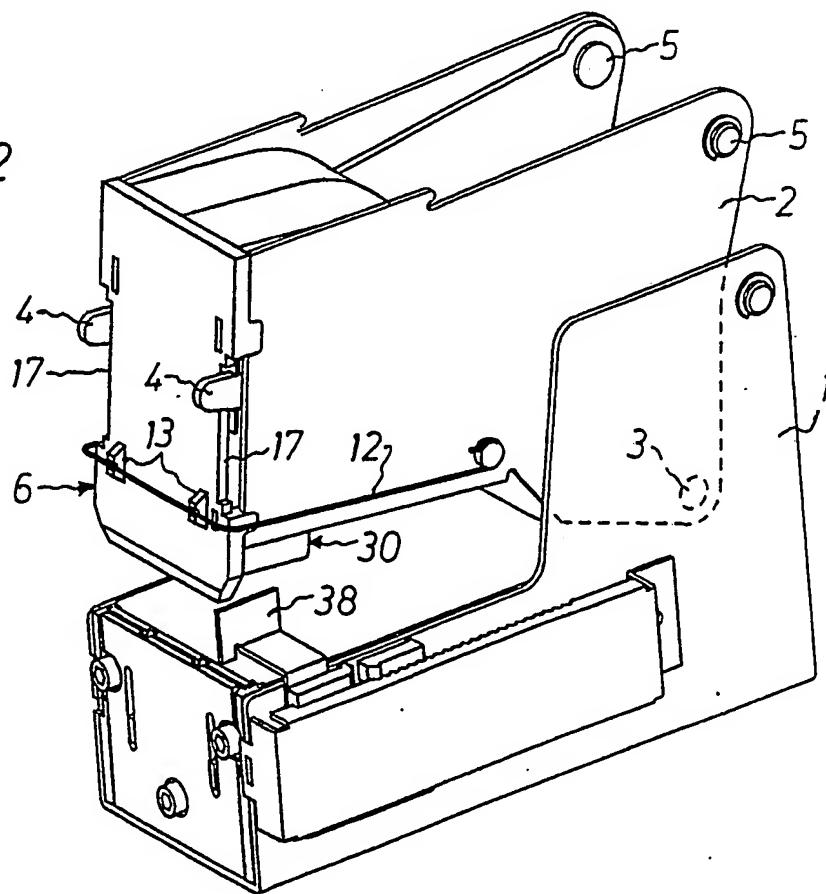
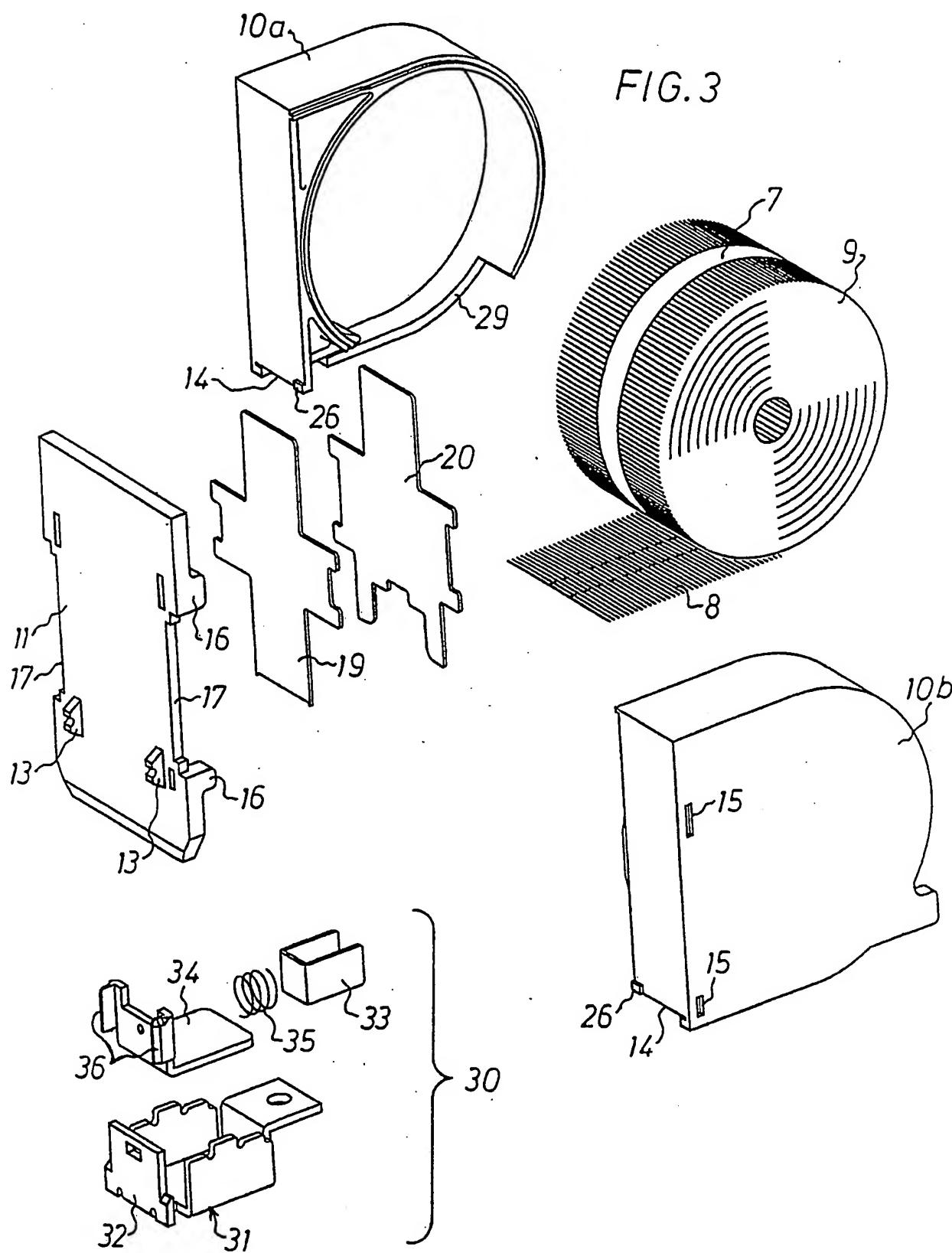


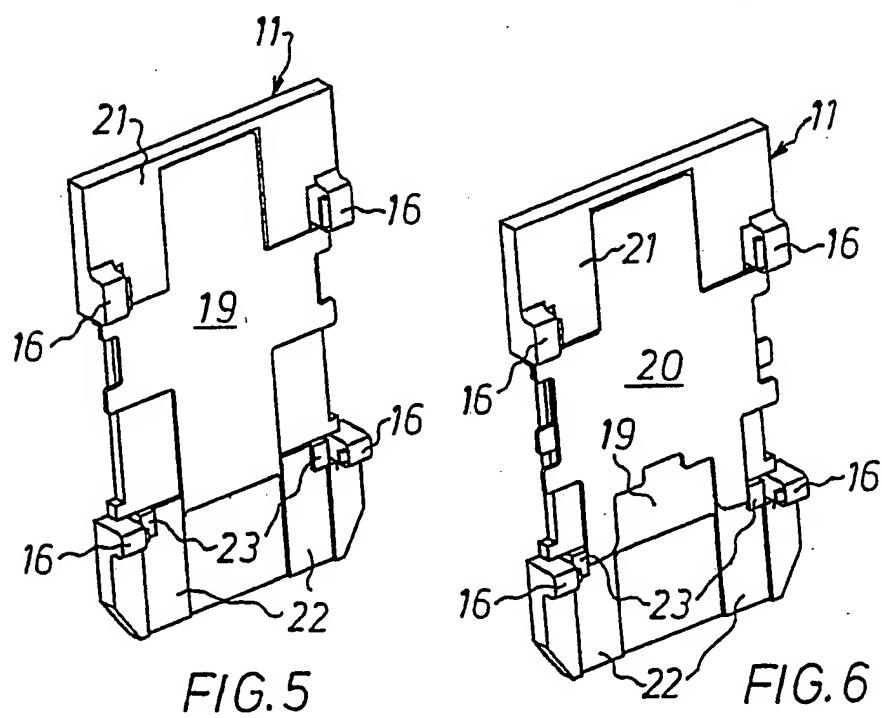
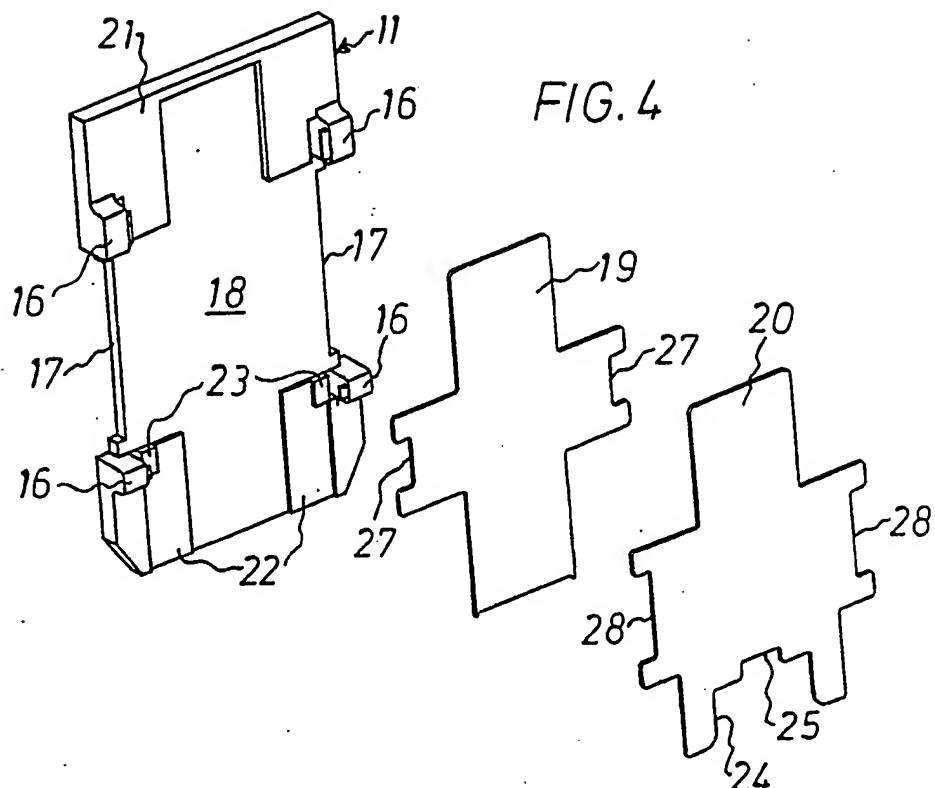
FIG.2



2/5



3/5



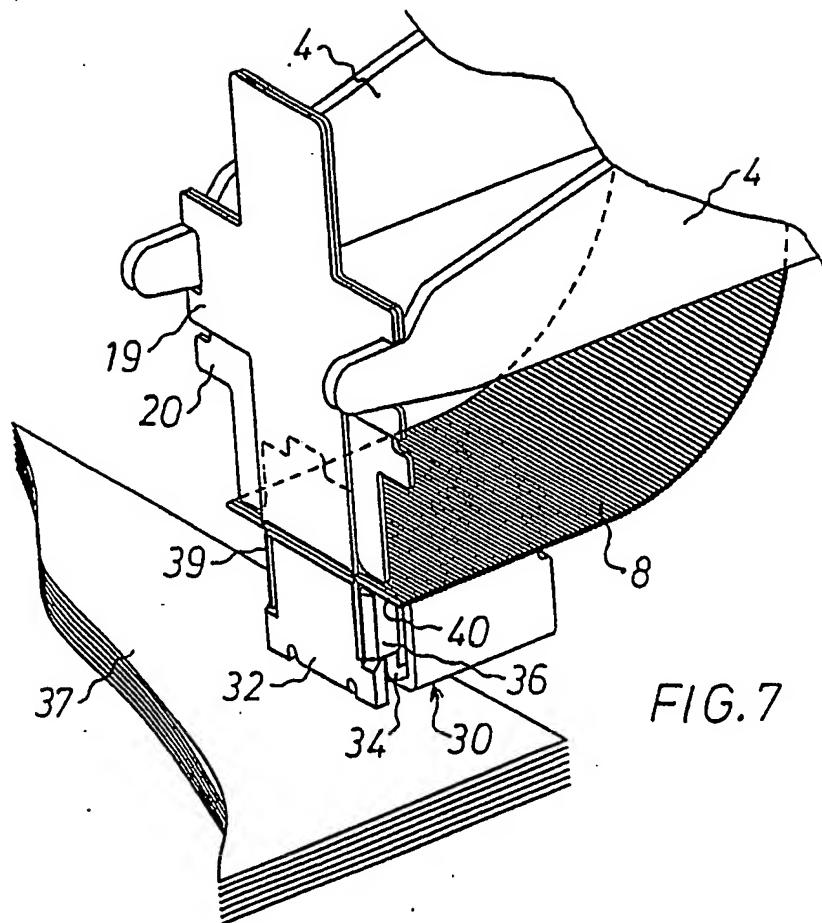


FIG. 7

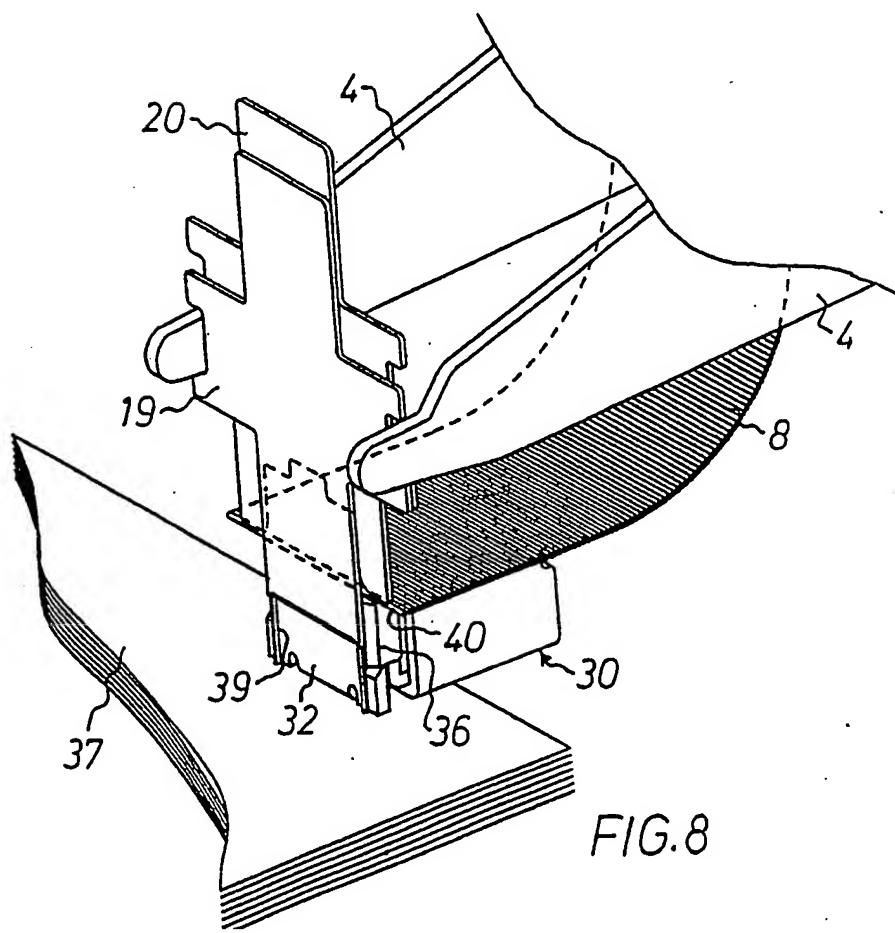


FIG. 8

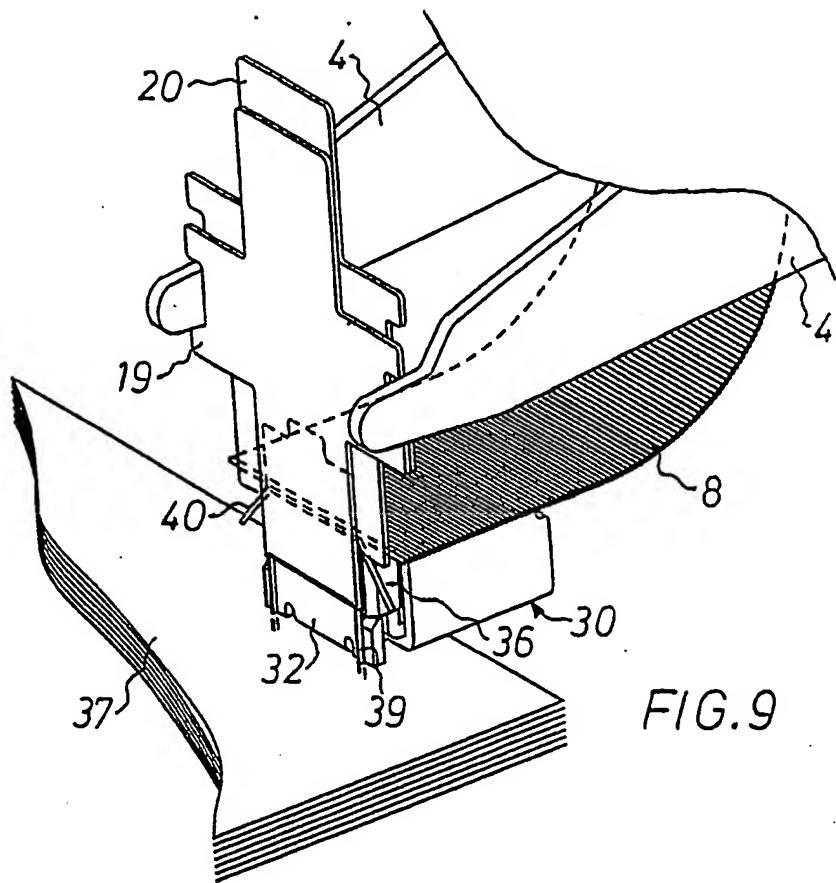


FIG. 9

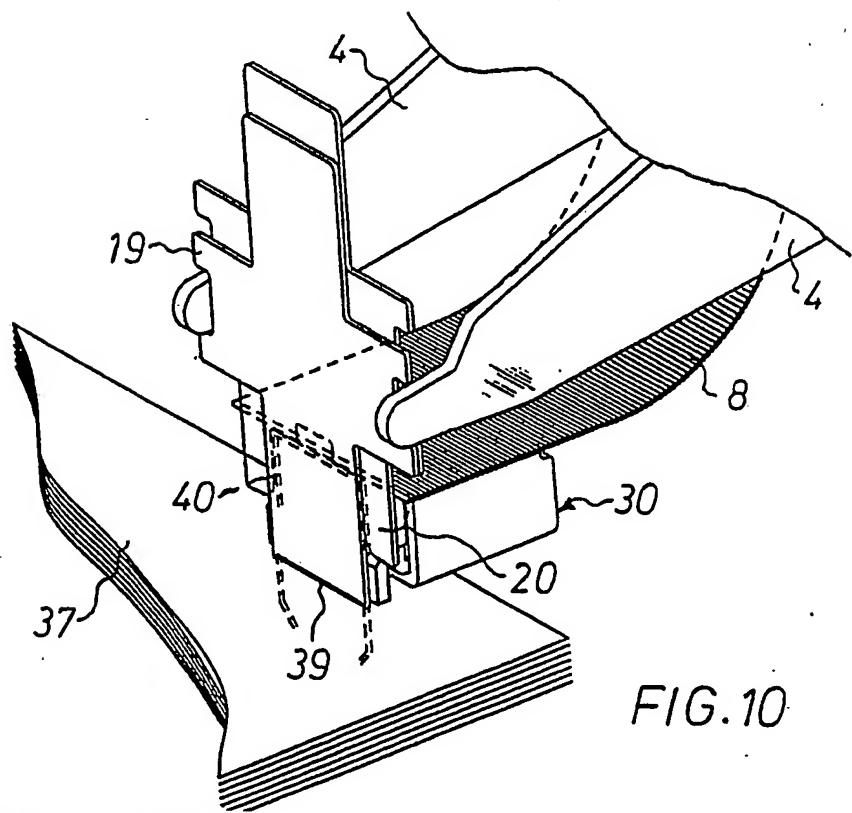


FIG. 10

**A. CLASSIFICATION OF SUBJECT MATTER**

**IPC5: B25B 5/00, B25B 5/04, B27F 7/21, B27F 7/28**  
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**B. FIELDS SEARCHED**

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>EP, A1, 0448255 (XEROX CORPORATION), 25 Sept 1991    (25.09.91), See claim 3 which says that the    forming block is mounted on the removable    cartridge containing the staple wires</p> <p>-----</p>	1

Further documents are listed in the continuation of Box C.

See patent family annex.

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A1- 0448255	25/09/91	US-A- 5150826	29/09/92